



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,003	03/16/2004	Shinpei Iijima	8017-1130	1592
466	7590	06/03/2005	EXAMINER	
YOUNG & THOMPSON 745 SOUTH 23RD STREET 2ND FLOOR ARLINGTON, VA 22202			GARCIA, JOANNIE A	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 06/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

<b>Office Action Summary</b>	<b>Application No.</b> 10/801,003	<b>Applicant(s)</b> IIJIMA ET AL	
	<b>Examiner</b> Joannie A. García	<b>Art Unit</b> 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 08 March 2004.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 4-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>03-16-04</u> . | 6) <input type="checkbox"/> Other: _____  |

Applicant's election without traverse of Group I, claims 4-14m in the reply filed on 03-08-05 is acknowledged.

The disclosure is objected to because of the following informalities: On page 28, line 22, "101" after "crown structures", should be replaced with --1011--.

Appropriate correction is required.

Claims 4-14 are objected to because of the following informalities:

In claim 4, lines 6 and 18, "crown" should be preceded by --cylindrical--.

In claim 4, line 11, "crown structure", first and second occurrences, should be preceded by --cylindrical--.

In claim 4, line 18, "crown structure", should be preceded by --cylindrical--.

There is no antecedent basis for "second conducting material deposited", line 12.

In claim 5, line 5, "crown structure", should be preceded by --cylindrical--.

In claim 7, line 5, "etching" should be followed by --method--.

In claim 8, line 3, "crown structure", should be preceded by --cylindrical--.

In claim 8, lines 6, and 8, "anisotropic dry etching" should be followed by --method--.

In claim 10, line 3, "mechanical strength" should be preceded by --a--.

Appropriate correction is required.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2823

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa (U.S. Patent 6,873,002), in combination with Iijima et al (US 2001/0038114 A1).

Nishikawa discloses a capacitor element comprising forming a cylindrical crown structure composed of a first conducting material 27 on a first insulating film 25 formed on a substrate of a semiconductor so as to seal an end of said cylindrical crown structure being in contact with said first insulating film (Figure 3F, and Column 5, lines 49-59), wherein said first conducting material includes metals, such as a TiN material (Column 49-52), depositing a Ru second conducting material 29 by a sputtering method, which is difficult to be oxidized as compared with said first conducting material, on an entire surface including a bottom of an opening of said cylindrical crown structure and a side wall of said cylindrical crown structure (Figure 3H, and Column 6, lines 1-10), wherein said first conducting material has a mechanical strength greater than that of said second conducting material (Column 5, lines 49-54, and Column 6, lines 1-8).

Nishikawa discloses removing by etching a second conducting material portion from the first insulating film, said second conducting material remaining on the bottom of said opening (Figure 3H), forming an accumulation electrode of said capacitor element, which is obtained by covering said first conducting material with said second conducting material, by growing a film by CVD of said second conducting material deposited on the bottom of the opening of said cylindrical crown structure and the side wall of said cylindrical crown structure while using said second conducting material as a seed layer (Figure 3H, and Column 6, lines 1-11), forming a

Art Unit: 2823

second insulating film 35 as a dielectric insulating film of said capacitor element, on an exposed surface of said accumulation electrode (Figure 3L, and Column 6, lines 52-67).

Nishikawa forming said second insulating film using an oxygen-containing material such as  $Ta_2O_5$  using a thermal CVD method with  $(Ta(OC_2H_5)_5)$  having a thickness of 10 nm at a temperature of 450 to 480 degrees Celsius (Column 2, lines 47-51, and Column 6, lines 52-67). Nishikawa does not teach introducing oxygen into an oxygen defect of said second insulating film.

Iijima et al discloses forming a second insulating film 33 as a dielectric insulating film of a capacitor element on a surface of an accumulation electrode 28 deposited on a surface of a first insulating film 24, wherein said accumulation electrode is thicker on a head top portion of a cylindrical crown structure than the surface of said first insulating film, and wherein said accumulation electrode is obtained by covering a first conducting material 29 with a second conducting material, by growing a film by CVD of said second conducting material deposited on a bottom of an opening 26 of said cylindrical crown structure and a side wall of said cylindrical crown structure while using said second conducting material as a seed layer (Figures 38, and 41, and Paragraph 0200), wherein the second insulating film 33 is made of  $Ta_2O_5$  using a thermal CVD method with  $(Ta(OC_2H_5)_5)$  as a starting gas and oxygen as an oxidizing gas agent, having a thickness of 10 nm at a temperature of 440 degrees Celsius (Paragraph 0205). It would have been within the scope of one of ordinary skill in the art to combine the teachings of Nishikawa and Iijima et al, to enable the formation step of the oxygen-containing  $Ta_2O_5$  second insulating film 29 of Nishikawa to be performed, by employing the disclosed oxygen introduction step Iijima et al.

Art Unit: 2823

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joannie García whose telephone number is (571) 272-1861. The examiner can normally be reached on Monday through Friday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571) 272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
JAG

May 28, 2005

GFourson  
Primary Examiner

  
George Fourson  
Primary Examiner  
Art Unit 2823